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EXHIBIT A

EXHIBIT A

Infringement of U.S. 7,620,327 by Fujitsu

Fujitsu Network Communications ("Fujitsu") infringed one or more claims of U.S. 7,620,327 by selling and offering for sale the Fujitsu 100G OIF 168pin Coherent Transceiver (FIM85200), 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100), 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100), 100G CFP Transceiver (FIM37101; FIM37102; FIM37102), 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402), 100G QSFP28 Transceiver (FIM37700; FIM37800), 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA), 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721), HD62 OTN Switch Aggregator Unit, TM61 OTU4 OTN Transponder Demarcation Unit, and Flashwave 7420 WDM Platform products, as well as the compatible chassis in which they are installed, and other products operating in a substantially similar manner such as, for example, the Flashwave 9500 Platform product and all compatible components and chassis, and the 1Finity Platform product and all compatible components and chassis. (the "Accused Instrumentalities").

Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
11	[pre] A transceiver	Fujitsu infringed Claim 1, and the claims discussed herein that directly or indirectly depend on
	card for a	Claim 1, by making, selling, using, offering for sale, and/or causing to be used the Accused
	telecommunications	Instrumentalities.
	box for transmitting	
	data over a first optical fiber and	To the extent that the preamble is considered to be a limitation, the Accused Instrumentalities comprise transceiver card for a telecommunications box for transmitting data over a first optical
	receiving data over a second optical fiber,	fiber and receiving data over a second optical fiber.
	the card comprising:	For example:
		the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a
		transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gtrx/index.html);

¹ Claim 1 is no longer asserted, but several claims dependent on Claim 1 remain at issue.

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim No.		
		the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/);
		the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/cfp2-aco/);
		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/);
		the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/); the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a
		transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-
		100g);
		the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of
		a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g);
		the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and
		receiving interface for DP-QPSK data (Flashwave CDS Data Sheet);
		the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a
		transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and

Asserted	Claim Element	Exemplary Evidence of Infringement	
Claim No.			
No.		the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet) By way of example and without any limitation, the OIF 100G standard taught a transceiver module, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 8-9 ("All the blocks illustrated are contained on a single printed circuit board. The large block on the right represents the 100G transceiver module – electro mechanicals. As discussed above this OIF project addresses physical aspects of this module and the electrical data and control interfaces to it."). 100G LH Framework 100G LH Module EM 100G LH Module EM 100G LH Module EM 100G LH Integrated Photonics Power, mechanical, thermal, control & electrical interface Figure 7. Block diagram of a transceiver module	

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Asserted	Claim Element	Exemplary Evidence of Infringement		
Claim		1 *******************************		
No.				
		By way of example and without any limitation, Fujitsu is a member of the OIF 100G standard.		
		See, e.g., OIF-DPC-MRX-01.0-IA at 32.		
		12 Appendix C: List of companies belonging to the OIF at approval		
			r companies belonging	to the Off at approval
		date		
		Acacia Communications	Fujikura	NeoPhotonics
		ADVA Optical Networking	Fujitsu	NTT Corporation
		Alcatel-Lucent	Furukawa Electric Japan	Oclaro
		Altera	Google	Orange
		AMCC	Hewlett Packard	PacketPhotonics
		Amphenol Corp.	Hitachi	PETRA
		Analog Devices	Huawei Technologies	Picometrix
		Anritsu	IBM Corporation	PMC Sierra
		Applied Communication Sciences	Infinera	QLogic Corporation
		Avago Technologies Inc.	Inphi	Qorvo
		Broadcom	Intel	Ranovus
		Brocade	Ixia	Rockley Photonics
		BRPhotonics	JDSU	Samtec Inc.
		BTI Systems	Juniper Networks	Semtech
		China Telecom	Kaiam	Spirent Communications
		Ciena Corporation	Kandou	Sumitomo Electric Industries
		Cisco Systems	KDDI R&D Laboratories	Sumitomo Osaka Cement
		ClariPhy Communications	Keysight Technologies, Inc.	TE Connectivity
		Coriant R&G GmbH	LeCroy	Tektronix
		CPqD	Luxtera	TELUS Communications, Inc.
		Deutsche Telekom	M/A-COM Technology Solutions	TeraXion
		Dove Networking Solutions	Mellanox Technologies	Texas Instruments
		EMC Corp	Microsemi Inc.	Time Warner Cable
		Emcore	Microsoft Corporation	US Conec
		Ericsson	Mitsubishi Electric Corporation	Verizon
		ETRI	Molex	Xilinx
		FCI USA LLC	MoSys, Inc.	Yamaichi Electronics Ltd.
		Fiberhome Technologies Group	MultiPhy Ltd	ZTE Corporation
		Finisar Corporation	NEC	
		Y		

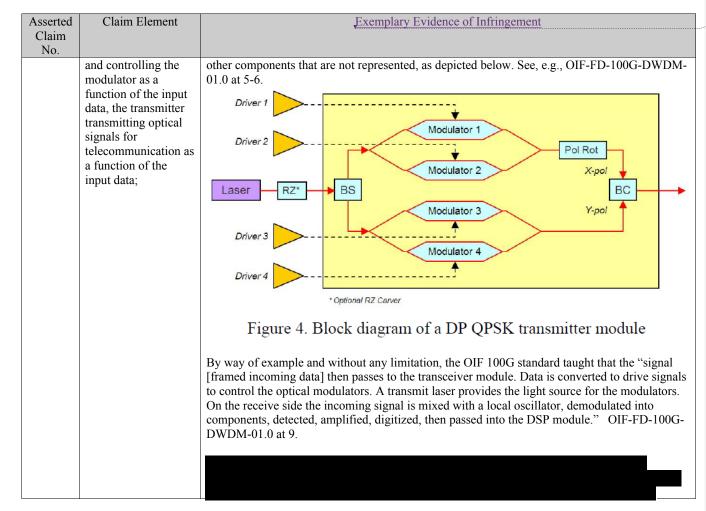
12 Appendix C: List of con date

Acacia Communications	Fujik
ADVA Optical Networking	Fujits
Alcatel-Lucent	Furul
Altera	Goog
AMCC	Hewl
Amphenol Corp.	Hitao
Analog Devices	Huav
Anritsu	IBM
Applied Communication Sciences	Infine
Avago Technologies Inc.	Inphi
Broadcom	Intel
Brocade	Ixia
BRPhotonics	JDSU
BTI Systems	Junip
China Telecom	Kaiar
Ciena Corporation	Kand
Cisco Systems	KDDI
ClariPhy Communications	Keys
Coriant R&G GmbH	LeCr
CPqD	Luxte
Deutsche Telekom	M/A
Dove Networking Solutions	Mella
EMC Corp	Micr
Emcore	Micr
Ericsson	Mits
ETRI	Mole
FCI USA LLC	MoS
Fiberhome Technologies Group	Mult
Finisar Corporation	NEC

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[a] a transmitter for	The Accused Instrumentalities include a transmitter for transmitting data over the first optical
	transmitting data over	fiber, the transmitter having a laser, a modulator, and a controller receiving input data and
	the first optical fiber,	controlling the modulator as a function of the input data, the transmitter transmitting optical
	the transmitter having	signals for telecommunication as a function of the input data.
	a laser, a modulator,	Decrees of consults and with out and limitation the OIE 100C standard to the
	and a controller	By way of example and without any limitation, the OIF 100G standard taught a transmitter
	receiving input data	module which includes a laser, modulators that modulate phase of the light, drivers, including



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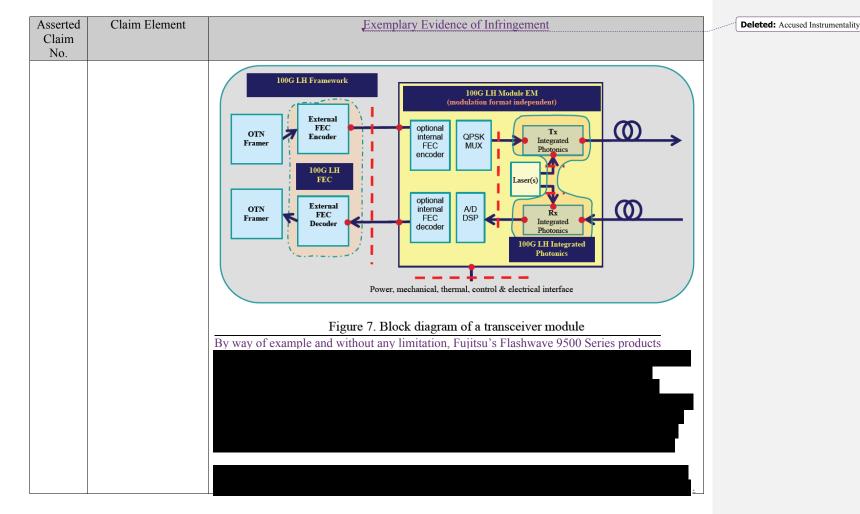
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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[],] - C],	
	[b] a fiber output optically connected	The Accused Instrumentalities include a fiber output optically connected to the laser for connecting the first optical fiber to the card. By way of example and without any limitation, the
	to the laser for	Accused Instrumentalities include optical fiber interfaces
	connecting the first	(100G OIF 168pin Coherent Transceiver Product Page,
	optical fiber to the	http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html);
	card;	100G/200G CFP2 ACO Transceiver Product Page,
	ĺ	http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/;
		100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/;
		100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/;

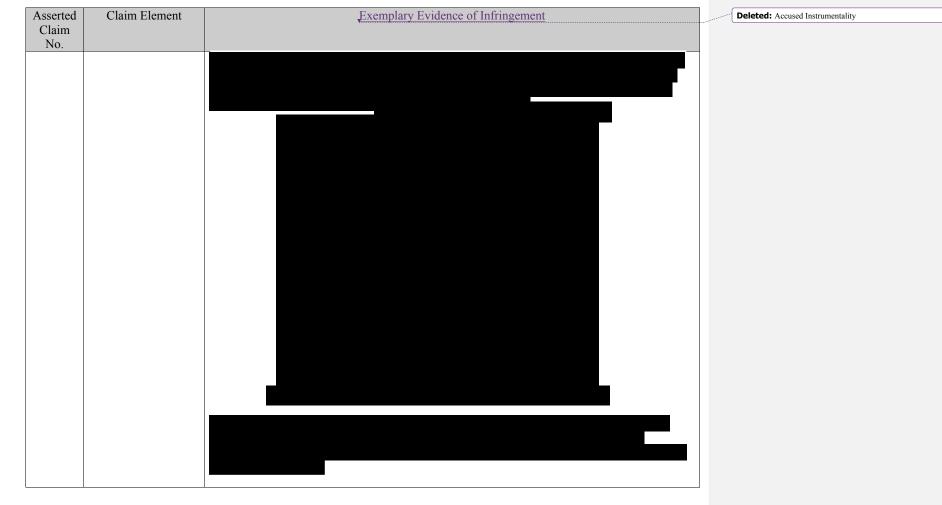
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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		100G QSFP28 Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/;
		100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		devices/#ln-100g);
		100G QSFP28 Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g;
		Flashwave CDS Data Sheet;
		Flashwave 7420 Data Sheet)
		By way of example and without any limitation, the OIF 100G standard taught a transceiver module in which the optical signal is transmitted by Tx through a fiber output, as depicted
		below. See, e.g., OIF-FD-100G-DWDM-01.0 at 9.

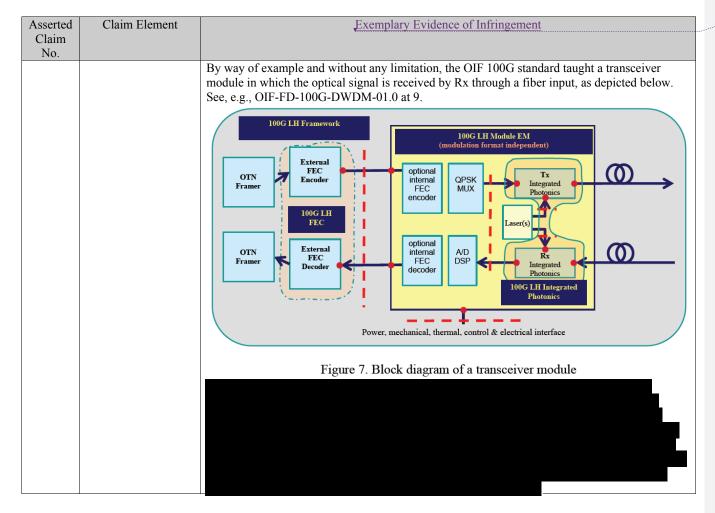


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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[c] a fiber input for	The Accused Instrumentalities include a fiber input for connecting the second optical fiber to the
	connecting the	card. By way of example and without any limitation, the Accused Instrumentalities include an
	second optical fiber	optical fiber interface (100G OIF 168pin Coherent Transceiver Product Page,
	to the card;	http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html);
		100G/200G CFP2 ACO Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/;
		100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp/;
		100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp2/;
		100G QSFP28 Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/;
		100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		devices/#ln-100g);
		100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g;
		Flashwave CDS Data Sheet;
		Flashwave 7420 Data Sheet)

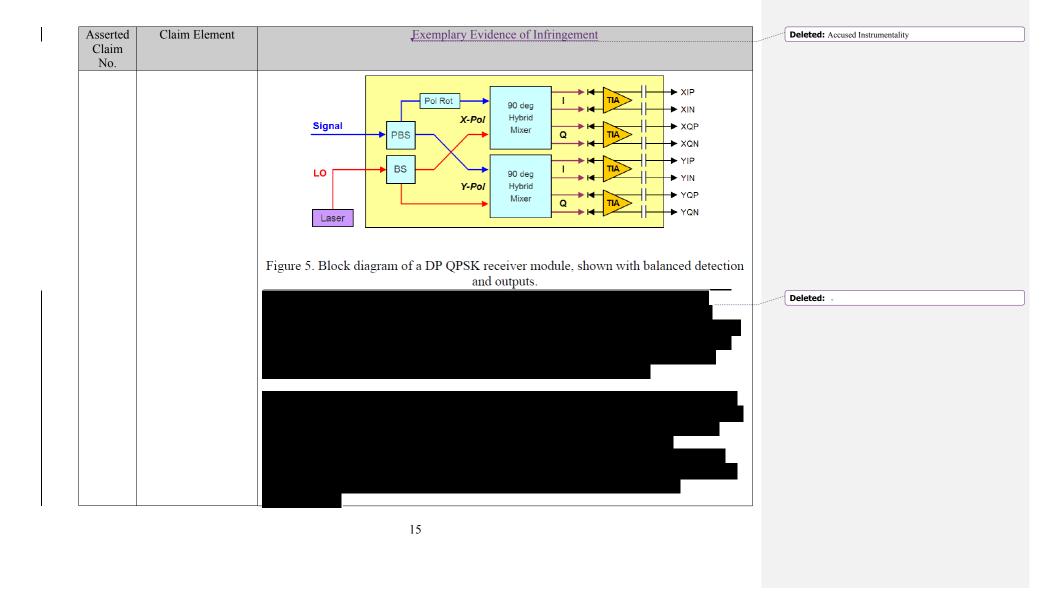


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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim No.			
110.			

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Asserted Claim No.	Claim Element	Exemplary Evidence of Infringement
	[d] a receiver optically connected	The Accused Instrumentalities include a receiver optically connected to the fiber input for receiving data from the second optical fiber.
	to the fiber input for receiving data from the second optical fiber; and	By way of example and without any limitation, the OIF 100G standard taught a receiver module which receives a phase modulated signal through an optical fiber, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.



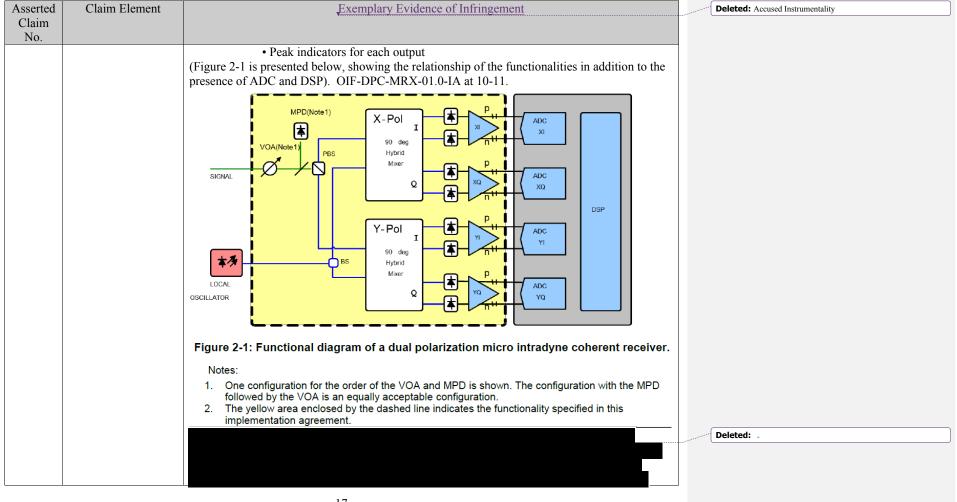
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Deleted: Accused Instrumentality

Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[e] an energy level	The Accused Instrumentalities include an energy level detector optically connected between the
	detector optically	receiver and the fiber input to measure an energy level of the optical signals, wherein the energy
	connected between	level detector includes a plurality of thresholds.
	the receiver and the	
	fiber input to measure	By way of example and without any limitation, the OIF 100G standard taught that:
	an energy level of the	[a]s indicated in Figure 2-1, the coherent receiver requires the following basic
	optical signals,	functionality:
	wherein the energy	1. Eight (8) photo-detectors, comprised of 4 sets of balanced detectors
	level detector	2. Four (4) linear amplifiers with differential ADC coupled outputs
	includes a plurality of thresholds.	3. Two (2) ninety degree hybrid mixers with differential outputs
	unresnoids.	4. A polarization splitting element, separating the input signal into two
		orthogonal polarizations, with each polarization delivered to a hybrid mixer
		5. A polarization maintaining power splitter or polarization splitting
		element, splitting the local oscillator power equally to the two hybrid
		mixers.
		6. An optical power tap, and monitor photodiode in the signal input path
		before the signal polarization splitting element.
		7. A variable optical attenuator in the signal input path before the signal
		polarization splitting element.
		Additional required functionality for the integrated coherent receiver includes:
		Automatic Gain Control (AGC) and/or Manual Gain Control (MGC)
		User settable output voltage swing
		Independent output swing adjustment for each of the four outputs

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Asserted Claim No.	Claim Element	Exemplary Evidence of Infringement

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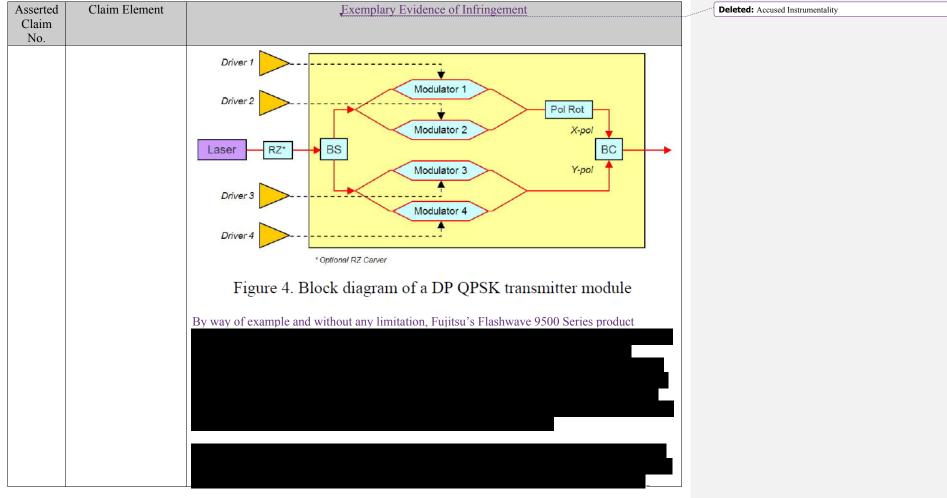
Asserted	Claim Element	Exemplary Evidence of Infringement	 Deleted: Accused Instrumentality
Claim No.			
NO.			

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Asserted	Claim Element	Exemplary Evidence of Infringement		
Claim				
No.				
3	The card as recited in	The Accused Instrumentalities include a modulator that is a phase modulator. QPSK requires		
	claim 1 wherein the	phase modulation. For example:		
	modulator is a phase	the Fujitsu 100G OTN Muxponder is a transceiver card with a transmitting and receiving		
	modulator.	interface for DP-QPSK data. (100G OIF 168pin Coherent Transceiver Product Page,		
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html);		
		the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card		
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver		
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/); the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card		
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO		
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-		
		modules/cfp2-aco/);		
		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a		
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP		
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-		
		modules/100gcfp/);		
		the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a		
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2		
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-		
		modules/100gcfp2/);		
		the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a		
		transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product		
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);		
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a		
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical		

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim No.		
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet)
		By way of example and without any limitation, the OIF 100G standard stated a DP QPSK transmitter module which includes a laser, modulators that modulate phase of the light, drivers, including other components that are not represented, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 5-6.

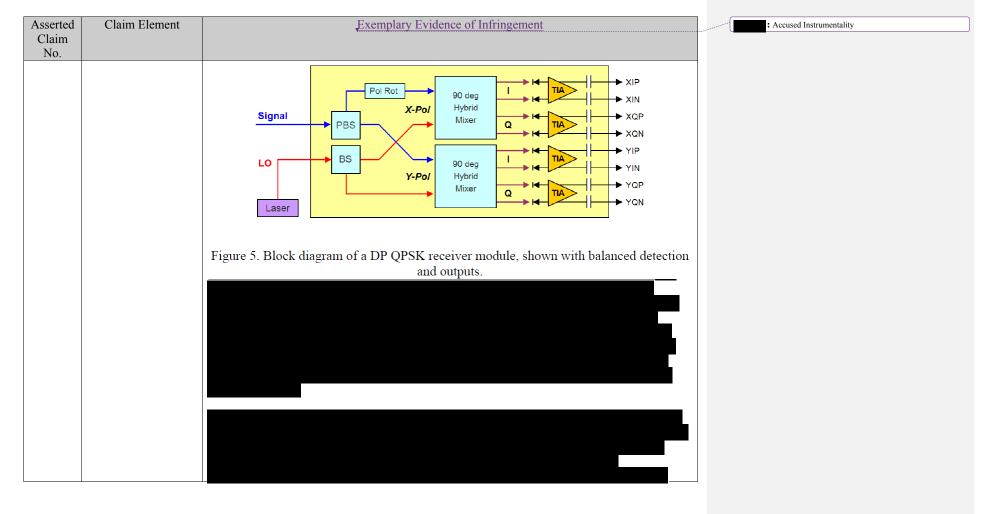


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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
4	The card as recited in	The Accused Instrumentalities include a receiver that receives phase-modulated signals. For
•	claim 3 wherein the	example:
	receiver receives	the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a
	phase-modulated	transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent
	signals.	Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gtrx/index.html);
		the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/);
		the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/cfp2-aco/); the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP)
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/);
		the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2

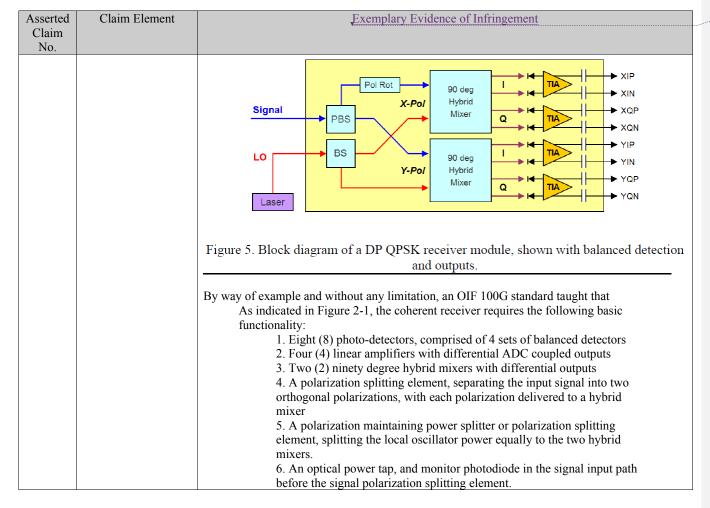
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Asserted	Claim Element	Exemplary Evidence of Infringement	
Claim No.			
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp2/); the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/); the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave T420 Data Sheet) By way of example and without any limitation, the OIF 100G standard taught that the "signal [framed incoming data] then passes to the transceiver module. Data is converted to drive signals to control the optical modulators. A transmit laser provides the light source for the modulators. On the receive side the incoming signal is mixed with a local oscillator, demodulated into components, detected, amplified, digitized, then passed into the DSP module." OIF-FD-100G-DWDM-01.0 at 9. By way of example and without any limitation, the OIF 100G standard taught a receiver module	
		which receives a phase modulated signal through an optical fiber, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.	



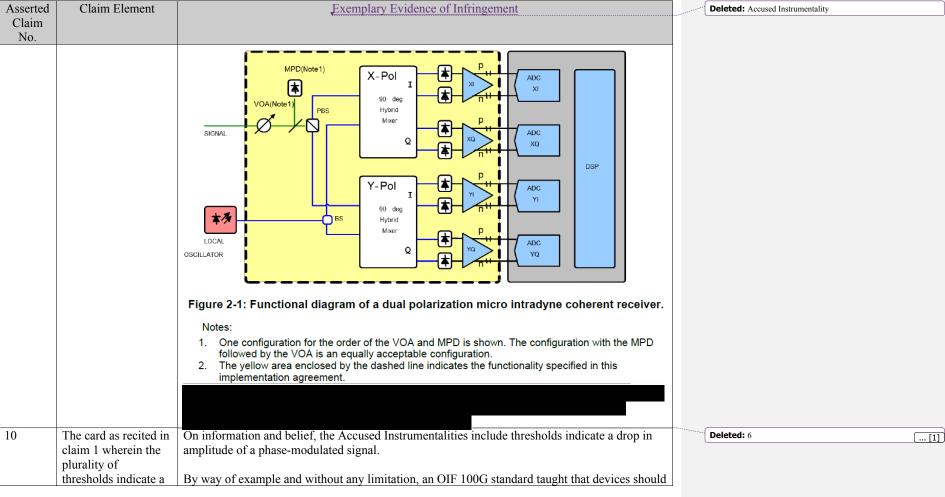
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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
5	The card as recited in	On information and belief, the Accused Instrumentalities have an energy level detector that
	claim 1 wherein the	includes a photodiode and a linear or logarithmic amplifier scaling an output of the photodiode.
	energy level detector	
	includes a photodiode	By way of example and without any limitation, the OIF 100G standard stated that DP QPSK
	and a liner or	receiver module contains optical detectors and amplifiers, as depicted below. See, e.g., OIF-FD-
	logarithmic amplifier	100G-DWDM-01.0 at 6.
	scaling an output of	
	the photodiode.	



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Asserted	Claim Element Exemplary Evidence of Infringement	
Claim		
No.		
		7. A variable optical attenuator in the signal input path before the signal
		polarization splitting element.
		Additional required functionality for the integrated coherent receiver includes:
		 Automatic Gain Control (AGC) and/or Manual Gain Control (MGC)
		User settable output voltage swing
		 Independent output swing adjustment for each of the four outputs
		 Peak indicators for each output
		(Figure 2-1 is presented below, showing the relationship of the functionalities in addition to the
		presence of ADC and DSP). OIF-DPC-MRX-01.0-IA at 10-11.



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Asserted	Claim Element	Exemplary Evidence of Infringement		Deleted: Accused Instrumentality
Claim No.				
	drop in amplitude of a phase-modulated	have "Alarm/Warning Threshold Registers," including including registers for an Rx power low warning and low alarm. (OIF-CFP2-ACO-01.0, at 81)		
	signal.	warming and low diamin. (On CTT2 TROO 01.0, at 01)		Moved (insertion) [1]
11	The card as recited in	On information and belief, the Accused Instrumentalities include thresholds indicate an increase		
11	The card as recited in	on information and benef, the receised instrumentanties include thresholds indicate all inclease	1	

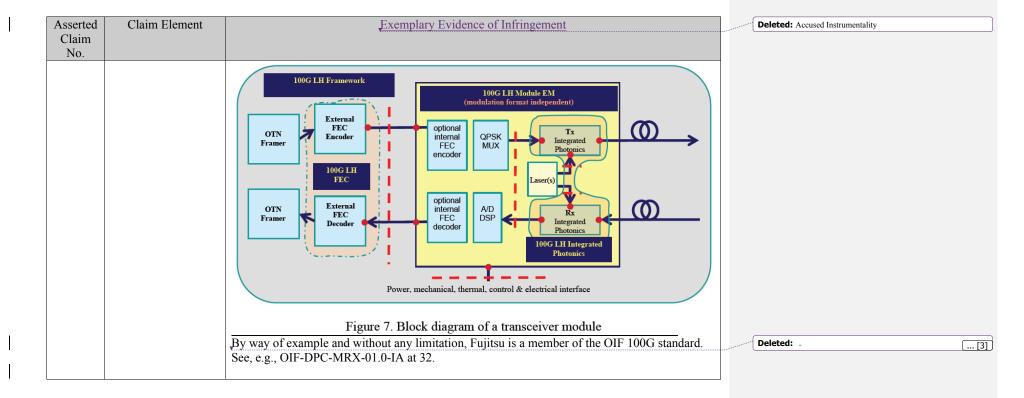
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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim			
No.	1 1 1 1 1		
	claim 1 wherein the	in an optical energy level.	
	plurality of		
	thresholds indicate an	By way of example and without any limitation, an OIF 100G standard taught that devices should	
	increase in an optical energy level.	have "Alarm/Warning Threshold Registers," including including registers for an Rx power high warning and high alarm. (OIF-CFP2-ACO-01.0, at 81)	
	energy level.	warning and nigh alarm. (Oir-Crr2-ACO-01.0, at 81)	Moved (insertion) [2]
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series product and	Ploved (ilisertion) [2]
		1Finity products include the card as recited in claim 1 wherein the plurality of thresholds	
		indicate an increase in an optical energy level. See, e.g., Exemplary Evidence of Infringement of	
		Claim 10.	
14	[pre] A transceiver	Fujitsu infringed Claim 14, and the claims discussed herein that directly or indirectly depend on	Deleted: 12[2]
	card for a	Claim 14, by making, selling, using, offering for sale, and/or causing to be used the Accused	
	telecommunications	Instrumentalities.	
	box for transmitting		
	data over a first	To the extent that the preamble is considered to be a limitation, the Accused Instrumentalities	
	optical fiber and	comprise transceiver card for a telecommunications box for transmitting data over a first optical	
	receiving data over a	fiber and receiving data over a second optical fiber.	
	second optical fiber, the card comprising:	For example:	
	the card comprising.	the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a	
		transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent	
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-	
		modules/100gtrx/index.html);	
		the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card	
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver	
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/);	
		the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card	
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO	
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-	
		modules/cfp2-aco/);	

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Asserted	Claim Element	Exemplary Evidence of Infringement	
Claim			
No.			
		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a	
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP	
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-	
		modules/100gcfp/);	
		the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a	
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2	
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-	
		modules/100gcfp2/);	
		the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a	
		transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product	
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);	
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a	
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical	
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-	
		100g);	
		the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the first of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a coherent receiver (FIM24901; FIM24721) i	
		a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Produc	
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g);	
		the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and	
		receiving interface for DP-QPSK data (Flashwave CDS Data Sheet);	
		the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a	
		transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and	
		the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving	
		interface for DP-QPSK data (Flashwave 7420 Data Sheet)	
		Dry way of avample and without any limitation, the OIE 100C standard towards a transcriver	
		By way of example and without any limitation, the OIF 100G standard taught a transceiver module, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 8-9 ("All the blocks	
		illustrated are contained on a single printed circuit board. The large block on the right represents	
		the 100G transceiver module – electro mechanicals. As discussed above this OIF project addresses physical aspects of this module and the electrical data and control interfaces to it.").	
		addresses physical aspects of this module and the electrical data and control interfaces to it.).	

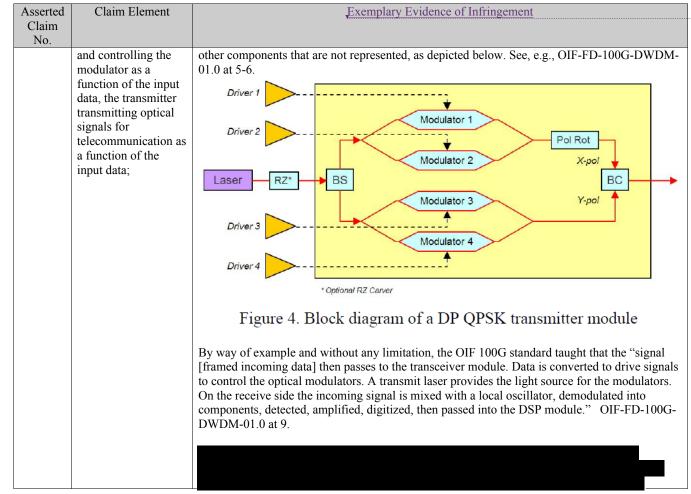
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Asserted Claim No.	Claim Element	Exemplary Evidence of Infringement		
		12 Appendix C: List o	f companies belonging	to the OIF at approval
		date	1 00	11
		Acacia Communications	Fujikura	NeoPhotonics
		ADVA Optical Networking	Fujitsu	NTT Corporation
		Alcatel-Lucent	Furukawa Electric Japan	Oclaro
		Altera	Google	Orange
		AMCC	Hewlett Packard	PacketPhotonics
		Amphenol Corp.	Hitachi	PETRA
		Analog Devices	Huawei Technologies	Picometrix
		Anritsu	IBM Corporation	PMC Sierra
		Applied Communication Sciences	Infinera	QLogic Corporation
		Avago Technologies Inc.	Inphi	Qorvo
		Broadcom	Intel	Ranovus
		Brocade	Ixia	Rockley Photonics
		BRPhotonics	JDSU	Samtec Inc.
		BTI Systems	Juniper Networks	Semtech
		China Telecom	Kaiam	Spirent Communications
		Ciena Corporation	Kandou	Sumitomo Electric Industries
		Cisco Systems	KDDI R&D Laboratories	Sumitomo Osaka Cement
		ClariPhy Communications	Keysight Technologies, Inc.	TE Connectivity
		Coriant R&G GmbH	LeCroy	Tektronix
		CPqD	Luxtera	TELUS Communications, Inc.
		Deutsche Telekom	M/A-COM Technology Solutions	TeraXion
		Dove Networking Solutions	Mellanox Technologies	Texas Instruments
		EMC Corp	Microsemi Inc.	Time Warner Cable
		Emcore	Microsoft Corporation	US Conec
		Ericsson	Mitsubishi Electric Corporation	Verizon
		ETRI	Molex	Xilinx
		FCI USA LLC	MoSys, Inc.	Yamaichi Electronics Ltd.
		Fiberhome Technologies Group	MultiPhy Ltd	ZTE Corporation
		Finisar Corporation	NEC	

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[-] - 4	
	[a] a transmitter for transmitting data over	The Accused Instrumentalities include a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator, and a controller receiving input data and
	the first optical fiber,	controlling the modulator as a function of the input data, the transmitter transmitting optical
	the transmitter having	signals for telecommunication as a function of the input data.
	a laser, a modulator	5-0
	and a controller	By way of example and without any limitation, the OIF 100G standard taught a transmitter
	receiving input data	module which includes a laser, modulators that modulate phase of the light, drivers, including

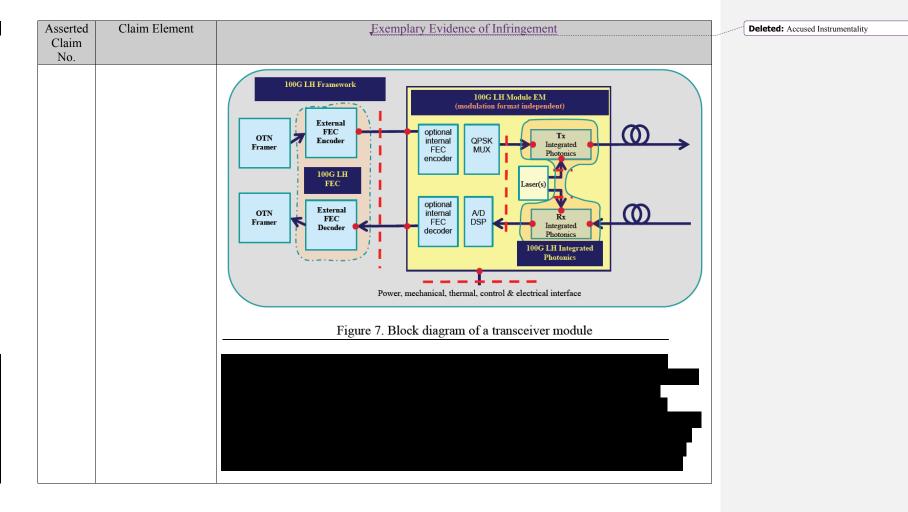


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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[b] a fiber output	The Accused Instrumentalities include a fiber output optically connected to the laser for
	optically connected	connecting the first optical fiber to the card. By way of example and without any limitation, the
	to the laser for	Accused Instrumentalities include an optical fiber interface. (100G OIF 168pin Coherent
	connecting the first	Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
	optical fiber to the	modules/100gtrx/index.html);
	card;	100G/200G CFP2 ACO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/;
		100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/;
		100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/;

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		100G QSFP28 Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/;
		100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		devices/#ln-100g);
		100G QSFP28 Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g;
		Flashwave CDS Data Sheet;
		Flashwave 7420 Data Sheet)
		By way of example and without any limitation, the OIF 100G standard taught a transceiver
		module in which the optical signal is transmitted by Tx through a fiber output, as depicted
		below. See, e.g., OIF-FD-100G-DWDM-01.0 at 9.

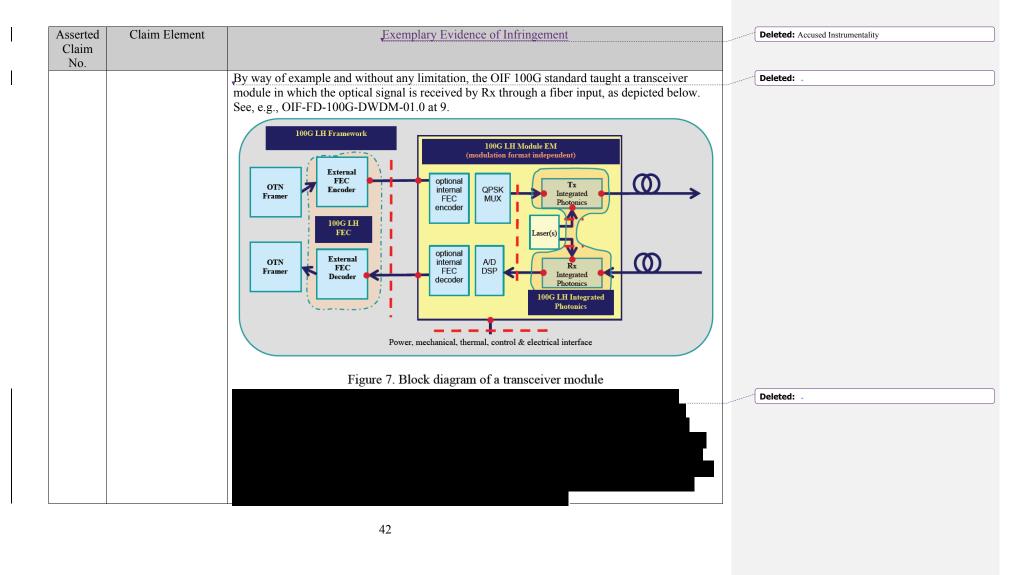


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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[c] a fiber input for	The Accused Instrumentalities include a fiber input for connecting the second optical fiber to the
	connecting the	card. By way of example and without any limitation, the Accused Instrumentalities include an
	second optical fiber	optical fiber interface (100G OIF 168pin Coherent Transceiver Product Page,
	to the card;	http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html);
		100G/200G CFP2 ACO Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/;
		100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/;
		100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/;
		100G QSFP28 Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/;
		100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		devices/#ln-100g);
		100G QSFP28 Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g; Flashwave CDS Data Sheet;
		Flashwave CDS Data Sheet, Flashwave 7420 Data Sheet)
		Hashwaye 1420 Data Sheet)

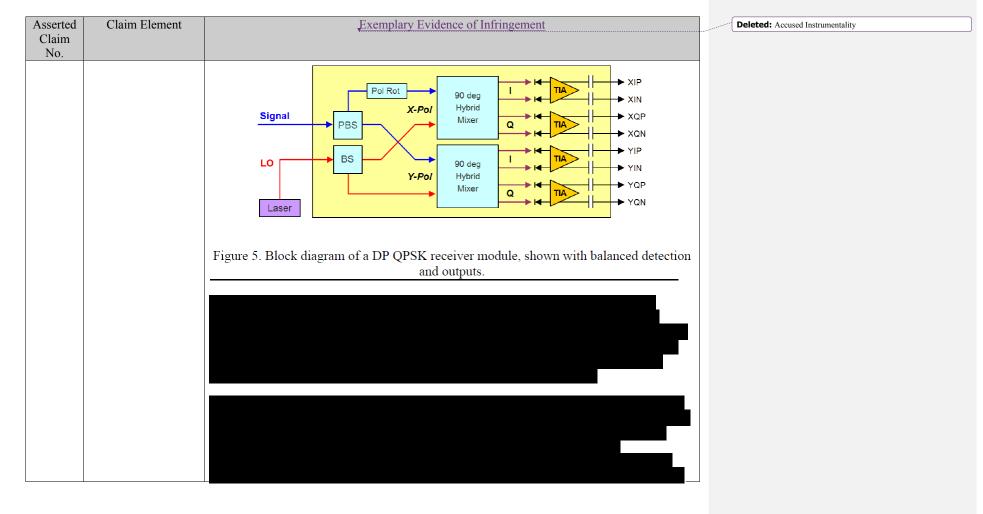


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Asserted	Claim Element	Exemplary Evidence of Infringement	 Deleted: Accused Instrumentality
Claim No.			

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sserted Claim No.	Claim Element	Exemplary Evidence of Infringement		
110.				
	[d] a receiver	The Accused Instrumentalities include a receiver optically connected to the fiber input for		
	optically connected to the fiber input for	receiving data from the second optical fiber.		
	receiving data from the second optical	By way of example and without any limitation, the OIF 100G standard taught a receiver module which receives a phase modulated signal through an optical fiber, as depicted below. See, e.g.,		
	fiber: and	OIF-FD-100G-DWDM-01.0 at 6.		

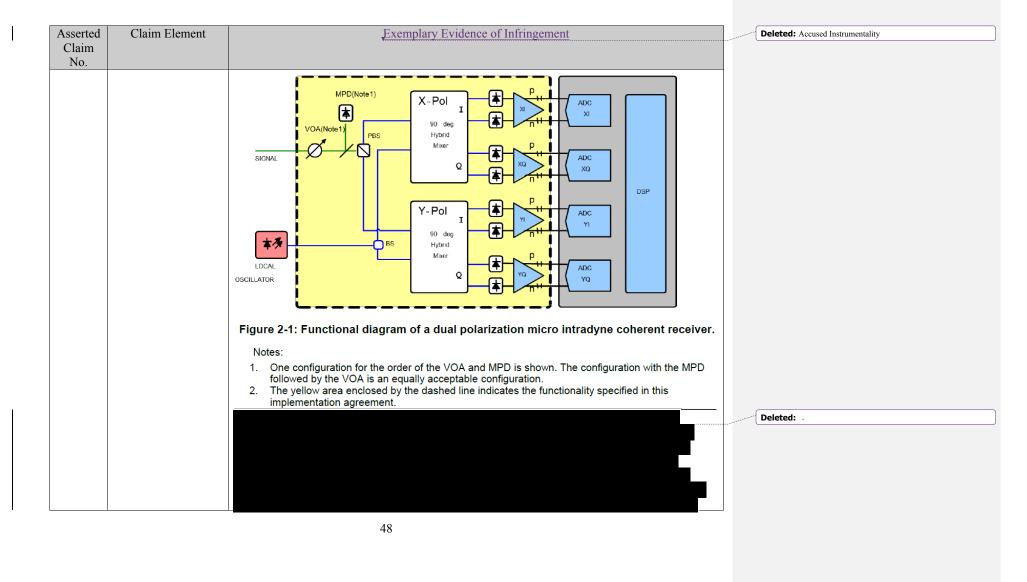


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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[e] an energy level	The Accused Instrumentalities include an energy level detector optically connected between the
	detector optically	receiver and the fiber input to measure an energy level of the optical signals, and the energy
	connected between	level detector includes a threshold indicating a drop in amplitude of a phase-modulated signal.
	the receiver and the	By way of example and without any limitation, an OIF 100G standard taught that devices should
	fiber input input to	have "Alarm/Warning Threshold Registers," including including registers for an Rx power low
	measure an energy	warning and low alarm. (OIF-CFP2-ACO-01.0, at 81)
	level of the optical	
	signals, the energy	By way of example and without any limitation, the OIF 100G standard taught that:
	level detector	[a]s indicated in Figure 2-1, the coherent receiver requires the following basic
	including a threshold	functionality:
	indicating a drop in	1. Eight (8) photo-detectors, comprised of 4 sets of balanced detectors
	amplitude of a phase-	2. Four (4) linear amplifiers with differential ADC coupled outputs
	modulated signal.	3. Two (2) ninety degree hybrid mixers with differential outputs
		4. A polarization splitting element, separating the input signal into two
		orthogonal polarizations, with each polarization delivered to a hybrid
		mixer
		5. A polarization maintaining power splitter or polarization splitting
		element, splitting the local oscillator power equally to the two hybrid
		mixers.
		6. An optical power tap, and monitor photodiode in the signal input path
		before the signal polarization splitting element.

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		7. A variable optical attenuator in the signal input path before the signal
		polarization splitting element.
		Additional required functionality for the integrated coherent receiver includes:
		 Automatic Gain Control (AGC) and/or Manual Gain Control (MGC)
		 User settable output voltage swing
		 Independent output swing adjustment for each of the four outputs
		 Peak indicators for each output
		(Figure 2-1 is presented below, showing the relationship of the functionalities in addition to the
		presence of ADC and DSP). OIF-DPC-MRX-01.0-IA at 10-11.



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	Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
	Claim			
	No.			
Į				

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
16	The card as recited in	The Accused Instrumentalities include a modulator that is a phase modulator. QPSK requires
	claim 14 wherein the	phase modulation. For example:
	modulator is a phase	the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a
	modulator.	transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gtrx/index.html);

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim No.		
		the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/);
		the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/cfp2-aco/);
		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/);
		the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/);
		the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-
		100g);
		the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of
		a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g);
		the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and
		receiving interface for DP-QPSK data (Flashwave CDS Data Sheet);
		the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a
		transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and

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Asserted	Claim Element	Exemplary Evidence of Infringement	 Deleted: Accused Instrumentality
Claim No.			
NO.		the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet) By way of example and without any limitation, the OIF 100G standard stated a DP QPSK transmitter module which includes a laser, modulators that modulate phase of the light, drivers, including other components that are not represented, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 5-6.	
		Driver 1 Driver 2 Modulator 1 Pol Rot X-pol BC Modulator 3 V-pol Priver 3 Modulator 4 Pol Rot Y-pol Pol Rot Nodulator 3	
		Figure 4. Block diagram of a DP QPSK transmitter module	
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise a card as recited in claim 14 wherein the modulator is a phase modulator. <i>See, e.g.</i> , Exemplary Evidence of Infringement of Claim 3.	 Deleted: .
17	The card as recited in claim 14 wherein the receiver receives	The Accused Instrumentalities include a receiver that receives phase-modulated signals. For example:	
		52	

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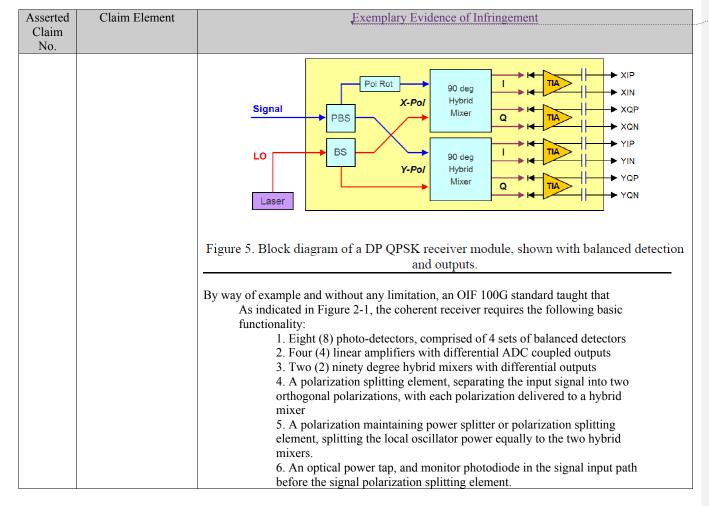
C1-:	y Evidence of Infringement
Claim	
No.	
	t Transceiver (FIM85200) is a transceiver card with a
	DP-QPSK data. (100G OIF 168pin Coherent
Transceiver Product Page, http://www.modules/100gtrx/index.html);	fujitsu.com/jp/group/foc/en/products/optical-
the Fujitsu 100G CFP DCO Transceive	er (FIM38000/100; FIM38100/100) is a transceiver card
	ace for DP-QPSK data. (100G CFP DCO Transceiver
	p/group/foc/en/products/optical-modules/cfp-dco/);
	insceiver (FIM38500; FIM38100) is a transceiver card
	ace for DP-QPSK data. (100G/200G CFP2 ACO
modules/cfp2-aco/);	fujitsu.com/jp/group/foc/en/products/optical-
	// M37101; FIM37102; FIM37201; FIM37102) is a
	I receiving interface for DP-QPSK data (100G CFP
Transceiver Product Page, http://www.i	fujitsu.com/jp/group/foc/en/products/optical-
modules/100gcfp/);	M37301; FIM37302; FIM37401; FIM37402) is a
	I receiving interface for DP-QPSK data (100G CFP2
modules/100gcfp2/);	fujitsu.com/jp/group/foc/en/products/optical-
the Fujitsu 100G QSFP28 Transceiver	(FIM37700; FIM37800) is a transceiver card with a
	DP-QPSK data (100G QSFP28 Transceiver Product
	(foc/en/products/optical-modules/100g-qsfp28/);
	(FTM7992HM; FTM7990HKA; FTM7977HQA) is a
	I receiving interface for DP-QPSK data (100G Optical
Devices Product Page, http://www.fujit 100g);	su.com/jp/group/foc/en/products/optical-devices/#In-
	erent Receiver (FIM24901; FIM24721) is a component of
a transceiver with receiving interface for	or DP-QPSK data (100G QSFP28 Transceiver Product
Page, http://www.fujitsu.com/jp/group/	foc/en/products/optical-devices/#ln-100g);

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Asserted	Claim Element	Exemplary Evidence of Infringement	
Claim			
No.			
		the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet)	
		By way of example and without any limitation, the OIF 100G standard taught that the "signal [framed incoming data] then passes to the transceiver module. Data is converted to drive signals to control the optical modulators. A transmit laser provides the light source for the modulators. On the receive side the incoming signal is mixed with a local oscillator, demodulated into components, detected, amplified, digitized, then passed into the DSP module." OIF-FD-100G-DWDM-01.0 at 9.	
		By way of example and without any limitation, the OIF 100G standard taught a receiver module which receives a phase modulated signal through an optical fiber, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.	

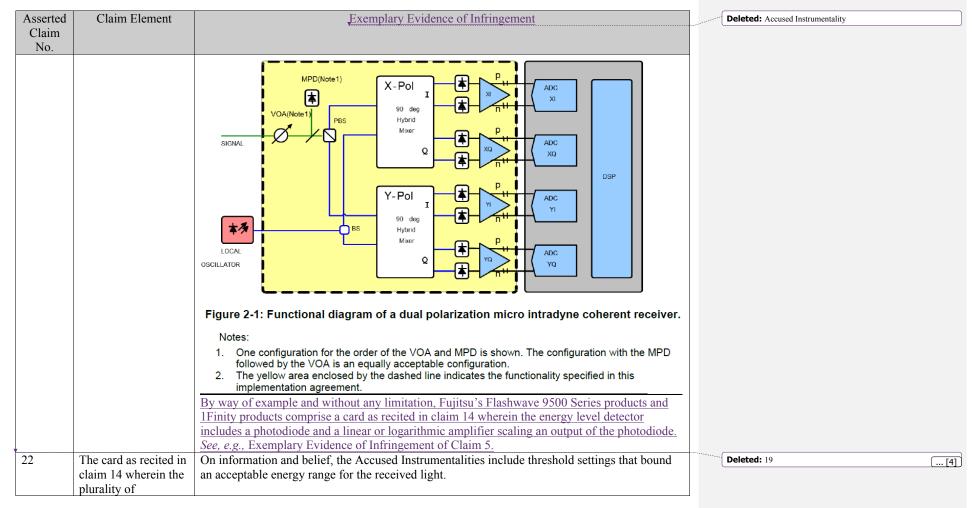
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Asserted	Claim Element	Exemplary Evidence of Infringement			
Claim					
No.					
		Signal PBS 90 deg Hybrid Mixer 90 deg Hybrid Mixer YIP YIP YIP YOP YOP YOP YOP YOP YOP YOP YOP YOP YO			
18	The card as recited in	modulated signals. <i>See, e.g.,</i> Exemplary Evidence of Infringement of Claim 4. On information and belief, the Accused Instrumentalities have an energy level detector that			
	claim 14 wherein the energy level detector includes a photodiode	includes a photodiode and a linear or logarithmic amplifier scaling an output of the photodiode.			
	and a liner or	receiver module contains optical detectors and amplifiers, as depicted below. See, e.g., OIF-FD-			
	logarithmic amplifier scaling an output of	100G-DWDM-01.0 at 6.			
	the photodiode.				



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Asserted	Claim Element	Exemplary Evidence of Infringement		
Claim				
No.				
		7. A variable optical attenuator in the signal input path before the signal		
		polarization splitting element.		
		Additional required functionality for the integrated coherent receiver includes:		
		 Automatic Gain Control (AGC) and/or Manual Gain Control (MGC) 		
		 User settable output voltage swing 		
		 Independent output swing adjustment for each of the four outputs 		
		 Peak indicators for each output 		
		(Figure 2-1 is presented below, showing the relationship of the functionalities in addition to the		
		presence of ADC and DSP). OIF-DPC-MRX-01.0-IA at 10-11.		

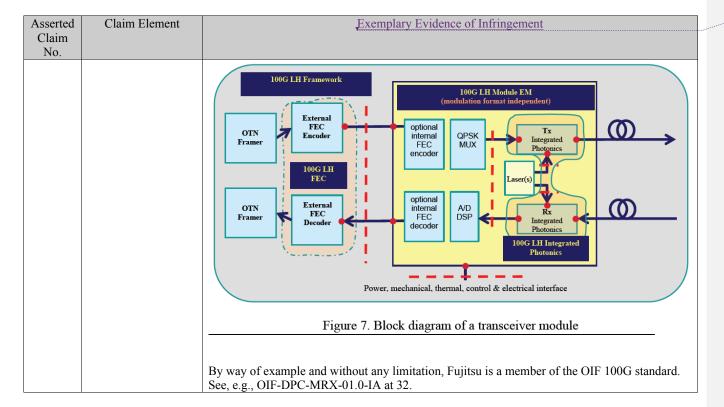


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Asserted	Claim Element	Exemplary Evidence of Infringement	 Deleted: Accused Instrumentality	
Claim No.				
	thresholds bound an acceptable energy range for the received light.	By way of example and without any limitation, an OIF 100G standard taught that devices should have "Alarm/Warning Threshold Registers," including an "RX Power Monitor Alarm/Warning Threshold Select." (OIF-CFP2-ACO-01.0, at 81) The threshold settings bound an acceptable energy range for the received light in order to provide a meaningful indication of when the power is out of an acceptable range. By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise a card as recited in claim 14 wherein the plurality of thresholds bound		
		an acceptable energy range for the received light. <i>See, e.g.,</i> Exemplary Evidence of Infringement of Claim 9.		
* 25	[pre] A transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber, the card comprising:	Fujitsu infringed Claim 25, and the claims discussed herein that directly or indirectly depend on Claim 25, by making, selling, using, offering for sale, and/or causing to be used the Accused Instrumentalities. To the extent that the preamble is considered to be a limitation, the Accused Instrumentalities comprise transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber. For example: the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html); the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/); the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/);	Deleted: 23 Moved up [1]: - By way of example and without any limitation,	[5]

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Asserted	Claim Element	Exemplary Evidence of Infringement		
Claim				
No.				
the Fujitsu 10		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a		
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP		
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-		
		modules/100gcfp/);		
		the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a		
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2		
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-		
		modules/100gcfp2/);		
		the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a		
		transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product		
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);		
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a		
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical		
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-		
		100g);		
		the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of		
		a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product		
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g);		
		the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and		
		receiving interface for DP-QPSK data (Flashwave CDS Data Sheet);		
		the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a		
		transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and		
		the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving		
		interface for DP-QPSK data (Flashwave 7420 Data Sheet)		
		By way of example and without any limitation, the OIF 100G standard taught a transceiver		
		module, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 8-9 ("All the blocks		
		illustrated are contained on a single printed circuit board. The large block on the right represents		
		the 100G transceiver module – electro mechanicals. As discussed above this OIF project		
		addresses physical aspects of this module and the electrical data and control interfaces to it.").		



Claim Element	Exemplary Evidence of Infringement		
	12 Appendix C: List o	f companies belonging	to the OIF at approval
	date		
		Fujikura	NeoPhotonics
		Fujitsu	NTT Corporation
	Alcatel-Lucent	Furukawa Electric Japan	Oclaro
	Altera	Google	Orange
	AMCC	Hewlett Packard	PacketPhotonics
	Amphenol Corp.	Hitachi	PETRA
	Analog Devices	Huawei Technologies	Picometrix
	Anritsu	IBM Corporation	PMC Sierra
	Applied Communication Sciences	Infinera	QLogic Corporation
	Avago Technologies Inc.	Inphi	Qorvo
	Broadcom	Intel	Ranovus
	Brocade	Ixia	Rockley Photonics
	BRPhotonics	JDSU	Samtec Inc.
	BTI Systems	Juniper Networks	Semtech
	China Telecom	Kaiam	Spirent Communications
	Ciena Corporation	Kandou	Sumitomo Electric Industries
	Cisco Systems	KDDI R&D Laboratories	Sumitomo Osaka Cement
	ClariPhy Communications	Keysight Technologies, Inc.	TE Connectivity
	Coriant R&G GmbH	LeCroy	Tektronix
	CPqD	Luxtera	TELUS Communications, Inc.
	Deutsche Telekom	M/A-COM Technology Solutions	TeraXion
	Dove Networking Solutions	Mellanox Technologies	Texas Instruments
	EMC Corp	Microsemi Inc.	Time Warner Cable
	Emcore	Microsoft Corporation	US Conec
	Ericsson	Mitsubishi Electric Corporation	Verizon
	ETRI	Molex	Xilinx
	FCI USA LLC	MoSys, Inc.	Yamaichi Electronics Ltd.
	Fiberhome Technologies Group	MultiPhy Ltd	ZTE Corporation
	Finisar Corporation	NEC	
	Claim Element	Acacia Communications ADVA Optical Networking Alcatel-Lucent Altera AMCC Amphenol Corp. Analog Devices Anritsu Applied Communication Sciences Avago Technologies Inc. Broadcom Brocade BRPhotonics BTI Systems China Telecom Ciena Corporation Cisco Systems ClariPhy Communications Coriant R&G GmbH CPqD Deutsche Telekom Dove Networking Solutions EMC Corp Emcore Ericsson ETRI FCI USA LLC Fiberhome Technologies Group	Acacia Communications ADVA Optical Networking Alcatel-Lucent Altera AMCC Amphenol Corp. Analog Devices Anritsu Applied Communication Sciences Avago Technologies Inc. Broadcom Bri Systems China Telecom Ciena Corporation Cisco Systems ClariPhy Communications Coriant R&G GmbH Corpo Corp Corp Corp Corp Corp Corp Cor

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Deleted: Accused Instrumentality

00 Series products and pox for transmitting data See, e.g., Exemplary
oox for transmitting data
oox for transmitting data
see, e.g., Exemplary
11 C 1 1
a over the first optical
ring input data and
transmitting optical
taught a transmitter
ght, drivers, including
OIF-FD-100G-DWDM-
OII -I D-100G-D W DWI-
Pol Rot
X-pol
BC
Y-pol
itter module
t

63

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Asserted	Claim Element	Exemplary Evidence of Infringement	
Claim No.			
INO.		By way of example and without any limitation, the OIF 100G standard taught that the "signal [framed incoming data] then passes to the transceiver module. Data is converted to drive signals to control the optical modulators. A transmit laser provides the light source for the modulators. On the receive side the incoming signal is mixed with a local oscillator, demodulated into components, detected, amplified, digitized, then passed into the DSP module." OIF-FD-100G-DWDM-01.0 at 9. By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data. See, e.g., Exemplary Evidence of Infringement of Claim 14[a].	
	[b] a fiber output optically connected to the laser for connecting the first optical fiber to the card;	The Accused Instrumentalities include a fiber output optically connected to the laser for connecting the first optical fiber to the card. By way of example and without any limitation, the Accused Instrumentalities include an optical fiber interface (100G OIF 168pin Coherent Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html); 100G/200G CFP2 ACO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/; 100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp/; 100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp2/; 100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/; 100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g);	

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Asserted	Claim Element	Exemplary Evidence of Infringement		
Claim				
	Claim Element	100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g; Flashwave CDS Data Sheet; Flashwave 7420 Data Sheet) By way of example and without any limitation, the OIF 100G standard taught a transceiver module in which the optical signal is transmitted by Tx through a fiber output, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 9. 100G LH Framework Tx		
		Figure 7. Block diagram of a transceiver module		
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise a fiber output optically connected to the laser for connecting the first		

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Asserted	Claim Element	Exemplary Evidence of Infringement	
Claim No.			
		optical fiber to the card. See, e.g., Exemplary Evidence of Infringement of Claim 14[b].	
	[c] a fiber input for connecting the second optical fiber to the card;	The Accused Instrumentalities include a fiber input for connecting the second optical fiber to the card. By way of example and without any limitation, the Accused Instrumentalities include an optical fiber interface (100G OIF 168pin Coherent Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html); 100G/200G CFP2 ACO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/; 100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp/; 100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp2/; 100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/; 100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); 100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g; Flashwave CDS Data Sheet; Flashwave 7420 Data Sheet) By way of example and without any limitation, the OIF 100G standard taught a transceiver	
		module in which the optical signal is received by Rx through a fiber input, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 9.	

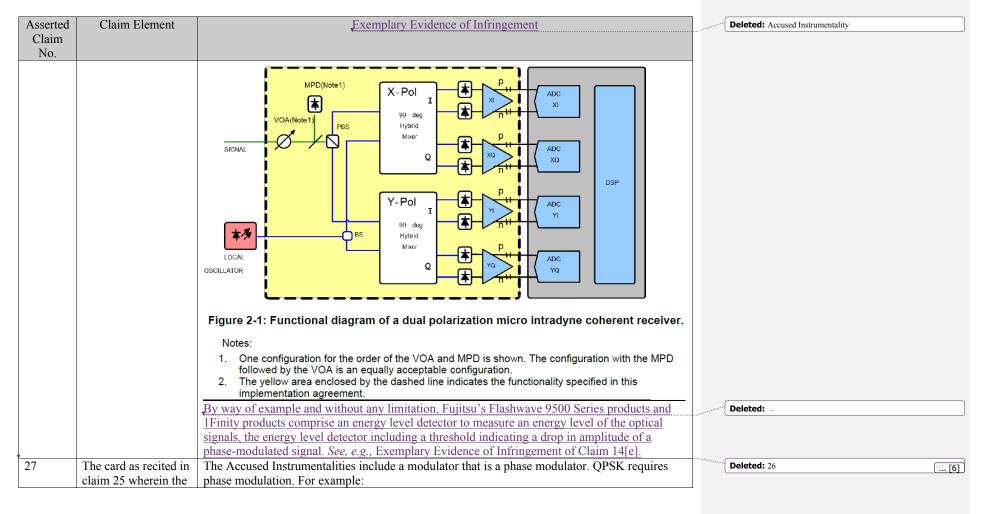
Asserted	Claim Element	Exemplary Evidence of Infringement		
Claim				
No.				
		OTN Framer OTN Framer 100G LH Module EM (modulation format independent) Tx		
		Figure 7. Block diagram of a transceiver module		
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and		
		1Finity products comprise a fiber input for connecting the second optical fiber to the card. See,		
	r 13 ·	e.g., Exemplary Evidence of Infringement of Claim 14[c].		
	[d] a receiver	The Accused Instrumentalities include a receiver optically connected to the fiber input for		
	optically connected	receiving data from the second optical fiber.		
	to the fiber input for	Dr. way of avamala and without any limitation, the OIE 100C standard to -1.4i		
	receiving data from	By way of example and without any limitation, the OIF 100G standard taught a receiver module		
	the second optical	which receives a phase modulated signal through an optical fiber, as depicted below. See, e.g.,		
	fiber; and	OIF-FD-100G-DWDM-01.0 at 6.		

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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim			
No.			
		Signal PBS Pol Rot 90 deg Hybrid Mixer PBS PBS Pol Rot Y-Pol Mixer PBS Pol Rot Y-Pol Hybrid Mixer PCD Y-QP Y-QN	
		Figure 5. Block diagram of a DP QPSK receiver module, shown with balanced detection and outputs.	
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and	Deleted: •
		1Finity products comprise a receiver optically connected to the fiber input for receiving data	
	F 3 1 1	from the second optical fiber. See, e.g., Exemplary Evidence of Infringement of Claim 14[d].	
	[e] an energy level	The Accused Instrumentalities include an energy level detector to measure an energy level of	
	detector to measure an energy level of the	the optical signals, and the energy level detector includes a threshold indicating a drop in amplitude of a phase-modulated signal. By way of example and without any limitation, an OIF	
	optical signals, the	100G standard taught that devices should have "Alarm/Warning Threshold Registers," including	
	energy level detector including a threshold	including registers for an Rx power low warning and low alarm. (OIF-CFP2-ACO-01.0, at 81)	
	indicating a drop in	By way of example and without any limitation, the OIF 100G standard taught that:	
	amplitude of a phase- modulated signal.	[a]s indicated in Figure 2-1, the coherent receiver requires the following basic functionality:	
		1. Eight (8) photo-detectors, comprised of 4 sets of balanced detectors	
		2. Four (4) linear amplifiers with differential ADC coupled outputs	
		3. Two (2) ninety degree hybrid mixers with differential outputs	
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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		4. A polarization splitting element, separating the input signal into two
		orthogonal polarizations, with each polarization delivered to a hybrid
		mixer
		5. A polarization maintaining power splitter or polarization splitting
		element, splitting the local oscillator power equally to the two hybrid
		mixers.
		6. An optical power tap, and monitor photodiode in the signal input path
		before the signal polarization splitting element.
		7. A variable optical attenuator in the signal input path before the signal
		polarization splitting element.
		Additional required functionality for the integrated coherent receiver includes:
		 Automatic Gain Control (AGC) and/or Manual Gain Control (MGC)
		 User settable output voltage swing
		 Independent output swing adjustment for each of the four outputs
		 Peak indicators for each output
		(Figure 2-1 is presented below, showing the relationship of the functionalities in addition to the
		presence of ADC and DSP). OIF-DPC-MRX-01.0-IA at 10-11.



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Claim Element	Exemplary Evidence of Infringement
modulator is a phase modulator.	the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html); the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/); the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/); the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp/); the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp2/); the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/); the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transcei
	modulator is a phase

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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim			
No.		the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and	
		receiving interface for DP-QPSK data (Flashwave CDS Data Sheet);	
		the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a	
		transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and	
		the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet)	
		By way of example and without any limitation, the OIF 100G standard stated a DP QPSK	
		transmitter module which includes a laser, modulators that modulate phase of the light, drivers, including other components that are not represented, as depicted below. See, e.g., OIF-FD-	
		100G-DWDM-01.0 at 5-6.	
		Driver 1 Driver 2 Modulator 1 Pol Rot Modulator 2 X-pol	
		Driver 3 Modulator 3 Modulator 4 Modulator 4	
		Driver 4	
		* Optional RZ Carver	
		Figure 4. Block diagram of a DP QPSK transmitter module	
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise the card as recited in claim 25 wherein the modulator is a phase	Deleted: -

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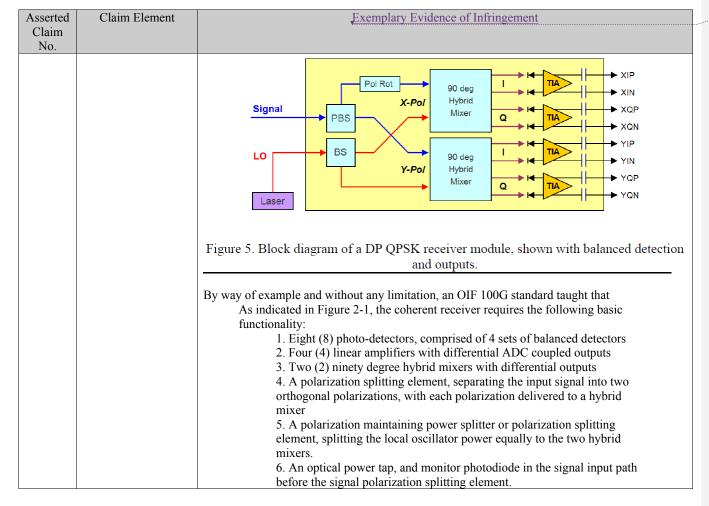
Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		modulator. See, e.g., Exemplary Evidence of Infringement of Claim 3.
28	The card as recited in	The Accused Instrumentalities include a receiver that receives phase-modulated signals. For
	claim 25 wherein the	example:
	receiver receives	t the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a
	phase-modulated	transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent
	signals.	Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gtrx/index.html);
		the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/);
		the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/cfp2-aco/);
		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/);
		the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/);
		the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a
		transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-
		100g);

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet)
		By way of example and without any limitation, the OIF 100G standard taught that the "signal [framed incoming data] then passes to the transceiver module. Data is converted to drive signals to control the optical modulators. A transmit laser provides the light source for the modulators. On the receive side the incoming signal is mixed with a local oscillator, demodulated into components, detected, amplified, digitized, then passed into the DSP module." OIF-FD-100G-DWDM-01.0 at 9.
		By way of example and without any limitation, the OIF 100G standard taught a receiver module which receives a phase modulated signal through an optical fiber, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.

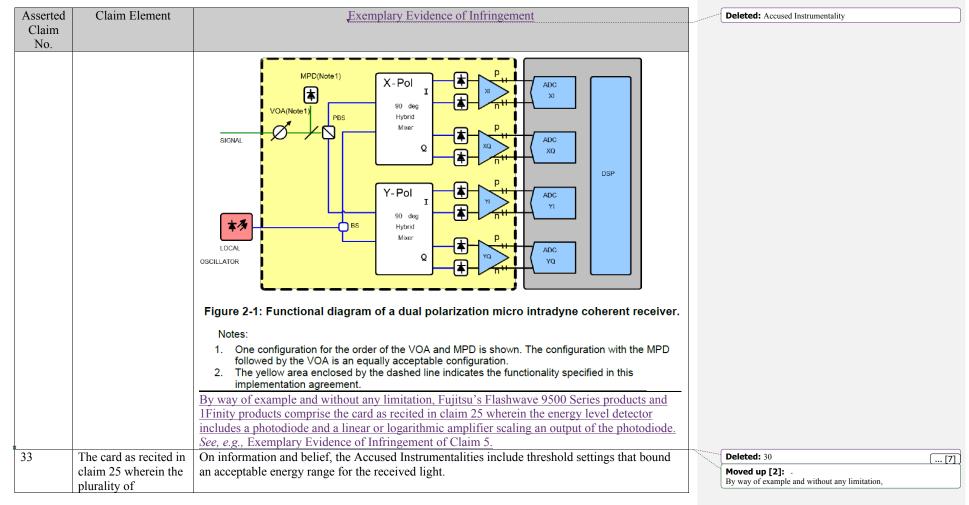
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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim No.		
INO.		Signal PBS 90 deg Hybrid Mixer Y-Pol Hybrid Mixer YQP YQP YQP YQP YQP YQP YQP YQ
29	The card as recited in claim 25 wherein the energy level detector includes a photodiode and a liner or logarithmic amplifier scaling an output of the photodiode.	On information and belief, the Accused Instrumentalities have an energy level detector that includes a photodiode and a linear or logarithmic amplifier scaling an output of the photodiode. By way of example and without any limitation, the OIF 100G standard stated that DP QPSK receiver module contains optical detectors and amplifiers, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.



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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		7. A variable optical attenuator in the signal input path before the signal
		polarization splitting element.
		Additional required functionality for the integrated coherent receiver includes:
		 Automatic Gain Control (AGC) and/or Manual Gain Control (MGC)
		User settable output voltage swing
		 Independent output swing adjustment for each of the four outputs
		 Peak indicators for each output
		(Figure 2-1 is presented below, showing the relationship of the functionalities in addition to the
		presence of ADC and DSP). OIF-DPC-MRX-01.0-IA at 10-11.



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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim No.		
	thresholds bound an acceptable energy range for the received light.	By way of example and without any limitation, an OIF 100G standard taught that devices should have "Alarm/Warning Threshold Registers," including an "RX Power Monitor Alarm/Warning Threshold Select." (OIF-CFP2-ACO-01.0, at 81) The threshold settings bound an acceptable energy range for the received light in order to provide a meaningful indication of when the power is out of an acceptable range.
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise the card as recited in claim 25 wherein the plurality of thresholds bound an acceptable energy range for the received light. <i>See, e.g.,</i> Exemplary Evidence of Infringement of Claim 9.
34	The card as recited in claim 25 wherein the	The Accused Instrumentalities include an energy level detector measures that optical power.
	energy level detector measures optical power.	By way of example and without any limitation, the OIF 100G standard taught the use of a monitoring photodiode that measures optical power. OIF-DPC-MRX-01.0-IA at 10-11.
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise the card as recited in claim 25 wherein the energy level detector measures optical power. <i>See, e.g.,</i> Exemplary Evidence of Infringement of Claim 12.
36	[pre] A transceiver card for a telecommunications box for transmitting	Fujitsu infringed Claim 36, and the claims discussed herein that directly or indirectly depend on Claim 36, by making, selling, using, offering for sale, and/or causing to be used the Accused Instrumentalities.
	data over a first optical fiber and receiving data over a second optical fiber,	To the extent that the preamble is considered to be a limitation, the Accused Instrumentalities comprise transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber.
	the card comprising:	For example: the Fujitsu 1100G OIF 168pin Coherent Transceiver (FIM85200) is a transceiver card with a transmitting and receiving interface for DP-QPSK data. (100G OIF 168pin Coherent

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		T ' D 1 (D 1) (C '' (C / / 1 (/ /) 1
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gtrx/index.html); the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/);
		the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/cfp2-aco/);
		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/); the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/);
		the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a
		transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-
		100g);
		the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of
		a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g);
		the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and
		receiving interface for DP-QPSK data (Flashwave CDS Data Sheet);
		receiving interface for D1-Q1 5K data (1 lashwave CD5 Data Sheet),

Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
No.		the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet) By way of example and without any limitation, the OIF 100G standard taught a transceiver module, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 8-9 ("All the blocks illustrated are contained on a single printed circuit board. The large block on the right represents the 100G transceiver module – electro mechanicals. As discussed above this OIF project addresses physical aspects of this module and the electrical data and control interfaces to it.").
		Figure 7. Block diagram of a transceiver module

Asserted	Claim Element		Exemplary Evidence of Int	<u>ringement</u>	
Claim					
No.					
		By way of example and with	out any limitation. Fujitsu is	s a member of the OIF 100G stand	dard
		See, e.g., OIF-DPC-MRX-01		a member of the off 1000 stance	uui u.
		12 Appendix C: List of	f companies belonging	to the OIF at approval	
			i companies belonging	to the Off at approvar	
		date			
		Acacia Communications	Fujikura	NeoPhotonics	
		ADVA Optical Networking	Fujitsu	NTT Corporation	
		Alcatel-Lucent	Furukawa Electric Japan	Oclaro	
		Altera	Google	Orange	
		AMCC	Hewlett Packard	PacketPhotonics	
		Amphenol Corp.	Hitachi	PETRA	
		Analog Devices	Huawei Technologies	Picometrix	
		Anritsu	IBM Corporation	PMC Sierra	
		Applied Communication Sciences	Infinera	QLogic Corporation	
		Avago Technologies Inc.	Inphi	Qorvo	
		Broadcom	Intel	Ranovus	
		Brocade	Ixia	Rockley Photonics	
		BRPhotonics	JDSU	Samtec Inc.	
		BTI Systems	Juniper Networks	Semtech	
		China Telecom	Kaiam	Spirent Communications	
		Ciena Corporation	Kandou	Sumitomo Electric Industries	
		Cisco Systems	KDDI R&D Laboratories	Sumitomo Osaka Cement	
		ClariPhy Communications	Keysight Technologies, Inc.	TE Connectivity	
		Coriant R&G GmbH	LeCroy	Tektronix	
		CPqD	Luxtera	TELUS Communications, Inc.	
		Deutsche Telekom	M/A-COM Technology Solutions	TeraXion	
		Dove Networking Solutions	Mellanox Technologies	Texas Instruments	
		EMC Corp	Microsemi Inc.	Time Warner Cable	
		Emcore	Microsoft Corporation	US Conec	
		Ericsson	Mitsubishi Electric Corporation	Verizon	
		ETRI	Molex	Xilinx	
		FCI USA LLC	MoSys, Inc.	Yamaichi Electronics Ltd.	
		Fiberhome Technologies Group	MultiPhy Ltd	ZTE Corporation	
		Finisar Corporation	NEC		

Deleted: Accused Instrumentality

Deleted:

12 Appendix C: List of con date

	Acacia Communications	Fujiku
	ADVA Optical Networking	Fujits
	Alcatel-Lucent	Furuk
	Altera	Googl
	AMCC	Hewle
	Amphenol Corp.	Hitacl
	Analog Devices	Huaw
	Anritsu	IBM C
	Applied Communication Sciences	Infine
	Avago Technologies Inc.	Inphi
	Broadcom	Intel
	Brocade	Ixia
	BRPhotonics	JDSU
	BTI Systems	Junipe
	China Telecom	Kaiam
	Ciena Corporation	Kando
	Cisco Systems	KDDI
	ClariPhy Communications	Keysig
	Coriant R&G GmbH	LeCro
	CPqD	Luxte
	Deutsche Telekom	M/A-
	Dove Networking Solutions	Mella
	EMC Corp	Micro
	Emcore	Micro
	Ericsson	Mitsu
	ETRI	Mole
	FCI USA LLC	MoSy
	Fiberhome Technologies Group	Multi
Deleted:	Finisar Corporation	NEC

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
Claim No.	[a] a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data;	By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and IFinity products comprise a transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber. See, e.g., Exemplary Evidence of Infringement of Claim 14. The Accused Instrumentalities include a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator, and a controller receiving input data and controlling the modulator as a function of the input data. By way of example and without any limitation, the OIF 100G standard taught a transmitter module which includes a laser, modulators that modulate phase of the light, drivers, including other components that are not represented, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 5-6. Driver 1 Modulator 2 *Optional RZ Carver Modulator 3 Modulator 4 *Optional RZ Carver
		Figure 4. Block diagram of a DP QPSK transmitter module

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim No.		
1101		By way of example and without any limitation, the OIF 100G standard taught that the "signal [framed incoming data] then passes to the transceiver module. Data is converted to drive signals to control the optical modulators. A transmit laser provides the light source for the modulators. On the receive side the incoming signal is mixed with a local oscillator, demodulated into components, detected, amplified, digitized, then passed into the DSP module." OIF-FD-100G-DWDM-01.0 at 9.
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and 1Finity products comprise a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data. <i>See, e.g.,</i> Exemplary Evidence of Infringement of Claim 14[a].
	[b] a fiber output optically connected to the laser for connecting the first optical fiber to the card;	The Accused Instrumentalities include a fiber output optically connected to the laser for connecting the first optical fiber to the card. By way of example and without any limitation, the Accused Instrumentalities include an optical fiber interface (100G OIF 168pin Coherent Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/opticalmodules/100gtrx/index.html); 100G/200G CFP2 ACO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/; 100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp/; 100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp2/; 100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/; 100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g);

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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim			
No.		100G QSFP28 Transceiver Product Page,	
		http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g;	
		Flashwave CDS Data Sheet;	
		Flashwave 7420 Data Sheet)	
		By way of example and without any limitation, the OIF 100G standard taught a transceiver module in which the optical signal is transmitted by Tx through a fiber output, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 9.	
		100G LH Framework 100G LH Module EM (modulation format independent)	
		OTN Framer External FEC optional internal FEC Photonics Laser(s)	
		OTN Framer External internal FEC Decoder Optional internal FEC decoder A/D DSP Integrated Photonics 100G LH Integrated Photonics	
		Power, mechanical, thermal, control & electrical interface	
		Figure 7. Block diagram of a transceiver module	
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and	Deleted: .
		1Finity products comprise a fiber output optically connected to the laser for connecting the first	
		optical fiber to the card. See, e.g., Exemplary Evidence of Infringement of Claim 14[b].	

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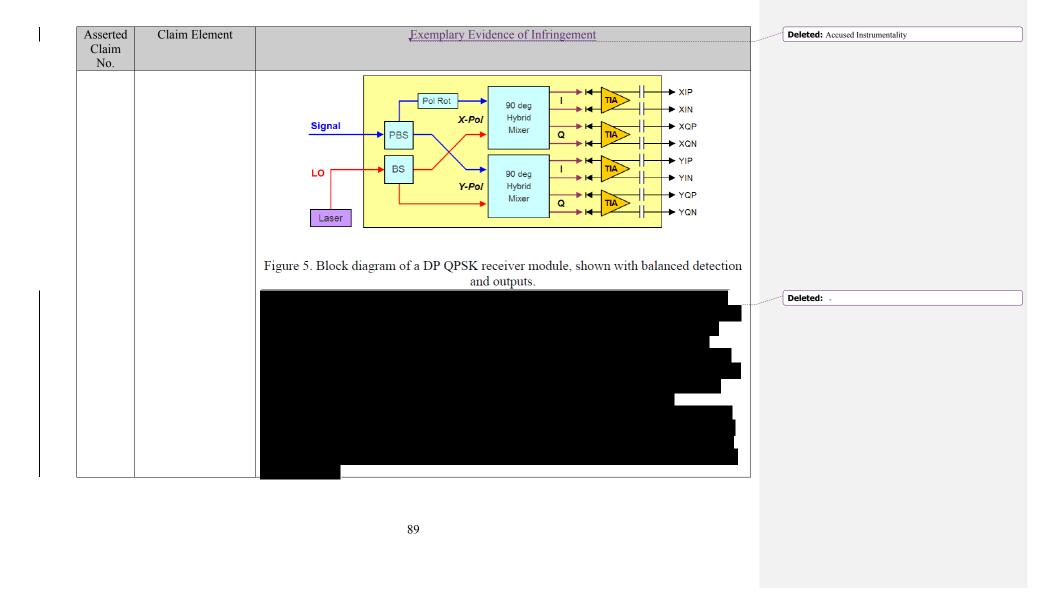
Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
	[c] a fiber input for connecting the second optical fiber to the card;	The Accused Instrumentalities include a fiber input for connecting the second optical fiber to the card. By way of example and without any limitation, the Accused Instrumentalities include an optical fiber interface (100G OIF 168pin Coherent Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html); 100G/200G CFP2 ACO Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp2-aco/; 100G CFP Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp/; 100G CFP2 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gcfp2/; 100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/; 100G Optical Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); 100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g; Flashwave CDS Data Sheet; Flashwave 7420 Data Sheet) By way of example and without any limitation, the OIF 100G standard taught a transceiver
		module in which the optical signal is received by Rx through a fiber input, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 9.

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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim			
No.			
		OTN Framer External FEC Decoder Power, mechanical, thermal, control & electrical interface	
		Figure 7. Block diagram of a transceiver module	
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and	Deleted: .
		1Finity products comprise a fiber input for connecting the second optical fiber to the card. See,	
	5.13	e.g., Exemplary Evidence of Infringement of Claim 14[c].	
	[d] a receiver optically connected to the fiber input for	The Accused Instrumentalities include a receiver optically connected to the fiber input for receiving data from the second optical fiber.	
	receiving data from	By way of example and without any limitation, the OIF 100G standard taught a receiver module	
	the second optical fiber;	which receives a phase modulated signal through an optical fiber, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.	

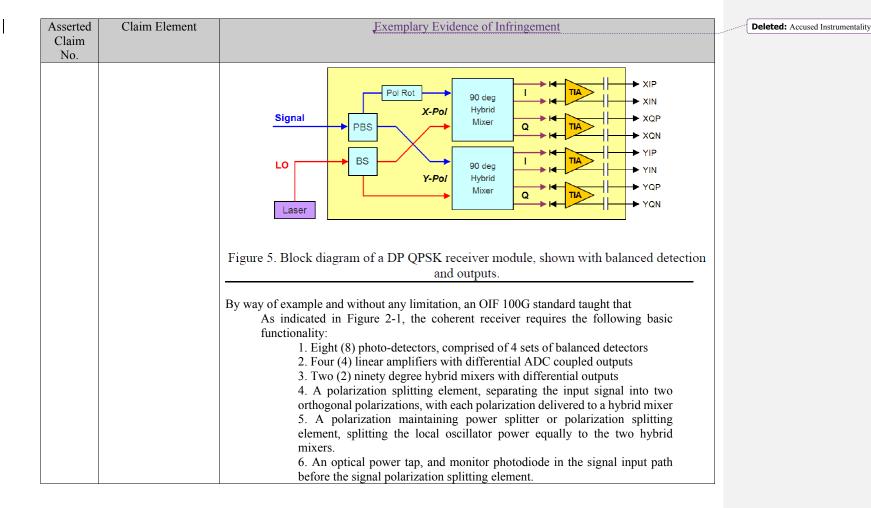
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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim			
No.			
		Signal PBS Y-Pol Rot PBS Y-Pol Hybrid Mixer 90 deg Hybrid Mixer YIP XIN XQP XQN YIN YQN YIN YQP YQN Figure 5. Block diagram of a DP QPSK receiver module, shown with balanced detection and outputs.	
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and	Deleted:
		1Finity products comprise a receiver optically connected to the fiber input for receiving data	
		from the second optical fiber. See, e.g., Exemplary Evidence of Infringement of Claim 14[d].	
	[e] a splitter to split at least a portion of the optical signals to	The Accused Instrumentalities include a splitter to split at least a portion of the optical signals to form a split optical signal.	
	form a split optical signal,	By way of example and without any limitation, the OIF 100G standard depicted the use splitters to split the optical signal and the local oscillator, as presented below. <i>See, e.g.</i> , OIF-FD-100G-DWDM-01.0 at 6.	



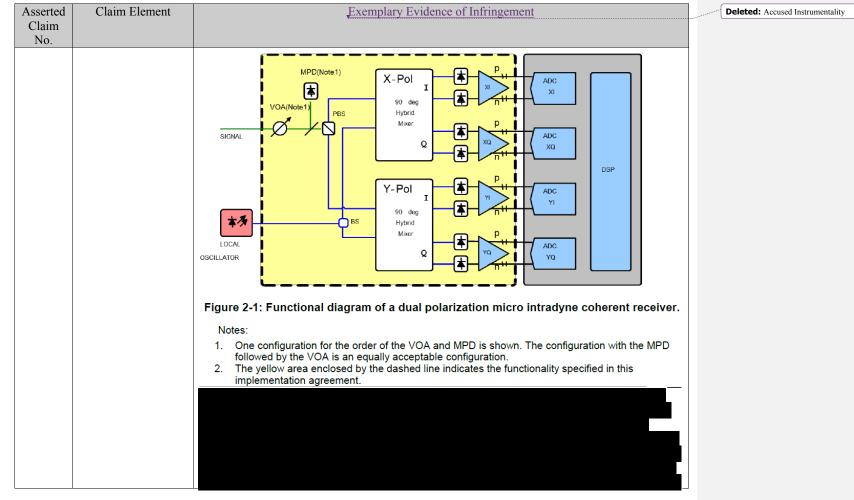
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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim No.		
TVO.	[f] a photodetector to measure the split optical signal, the photodetector outputting an electric voltage to correlating to an optical power of the split optical signal, and	The Accused Instrumentalities include a photodetector to measure the split optical signal, the photodetector outputting an electric voltage to correlating to an optical power of the split optical signal.
	[g] a detector controller connected electrically to the	The Accused Instrumentalities include a detector controller connected electrically to the photodetector.
	photodetector.	By way of example and without any limitation, the OIF 100G standard taught a receiver module with a number of optical components that form a demodulator, followed by optical detectors and transimpedance amplifiers, as shown below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.



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Asserted	Claim Element	Exemplary Evidence of Infringement		
Claim				
No.				
		7. A variable optical attenuator in the signal input path before the signal		
		polarization splitting element.		
		Additional required functionality for the integrated coherent receiver includes:		
		 Automatic Gain Control (AGC) and/or Manual Gain Control (MGC) 		
		User settable output voltage swing		
		 Independent output swing adjustment for each of the four outputs 		
		 Peak indicators for each output 		
		(Figure 2-1 is presented below, showing the relationship of the functionalities in addition to the		
		presence of ADC and DSP). OIF-DPC-MRX-01.0-IA at 10-11.		



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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
37	The card as recited in	The Accused Instrumentalities include a modulator that is a phase modulator. QPSK requires
37	claim 36 wherein the	phase modulation. For example, the Fujitsu 1100G OIF 168pin Coherent Transceiver
	modulator is a phase	(FIM85200) is a transceiver card with a transmitting and receiving interface for DP-QPSK data.
	modulator.	(100G OIF 168pin Coherent Transceiver Product Page,
		http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100gtrx/index.html);
		the Fujitsu 100G CFP DCO Transceiver (FIM38000/100; FIM38100/100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G CFP DCO Transceiver
		Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/cfp-dco/);
		the Fujitsu 100G/200G CFP2 ACO Transceiver (FIM38500; FIM38100) is a transceiver card
		with a transmitting and receiving interface for DP-QPSK data. (100G/200G CFP2 ACO
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/cfp2-aco/);
		the Fujitsu 100G CFP Transceiver (FIM37101; FIM37102; FIM37201; FIM37102) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp/); the Fujitsu 100G CFP2 Transceiver (FIM37301; FIM37302; FIM37401; FIM37402) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G CFP2)
		Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-
		modules/100gcfp2/);
		the Fujitsu 100G QSFP28 Transceiver (FIM37700; FIM37800) is a transceiver card with a
		transmitting and receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product
		Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-modules/100g-qsfp28/);
		the Fujitsu 100G/400G LN Modulator (FTM7992HM; FTM7990HKA; FTM7977HQA) is a
		transceiver card with a transmitting and receiving interface for DP-QPSK data (100G Optical

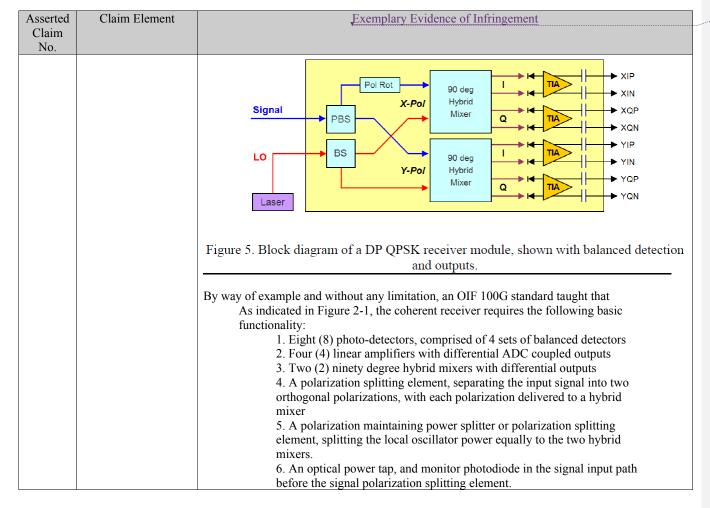
		[8]
Deleted:		

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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		Devices Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu 100G/400G Integrated Coherent Receiver (FIM24901; FIM24721) is a component of a transceiver with receiving interface for DP-QPSK data (100G QSFP28 Transceiver Product Page, http://www.fujitsu.com/jp/group/foc/en/products/optical-devices/#ln-100g); the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); and the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transmitting and receiving interface for DP-QPSK data (Flashwave 7420 Data Sheet)
		By way of example and without any limitation, the OIF 100G standard stated a DP QPSK transmitter module which includes a laser, modulators that modulate phase of the light, drivers, including other components that are not represented, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 5-6.

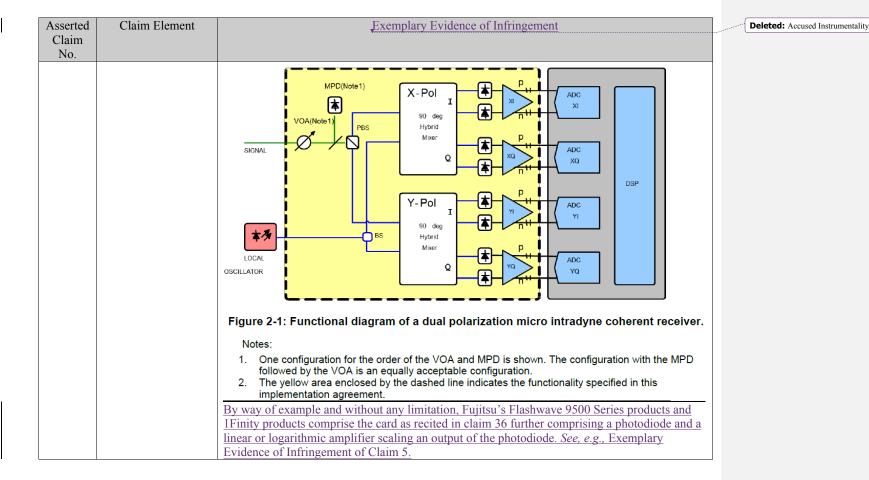
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Asserted	Claim Element	Exemplary Evidence of Infringement	Deleted: Accused Instrumentality
Claim			
No.			
		Driver 2 Modulator 1 Driver 3 Driver 4 * Optional RZ Carver Figure 4. Block diagram of a DP QPSK transmitter module	
		By way of example and without any limitation, Fujitsu's Flashwave 9500 Series products and	Deleted:
		1Finity products comprise a receiver optically connected to the fiber input for receiving data	
		from the second optical fiber. See, e.g., Exemplary Evidence of Infringement of Claim 3.	
38	The card as recited in claim 36 further comprising a	On information and belief, the Accused Instrumentalities have an energy level detector that includes a photodiode and a linear or logarithmic amplifier scaling an output of the photodiode.	
	photodiode and a liner or logarithmic amplifier scaling an output of the photodiode.	By way of example and without any limitation, the OIF 100G standard stated that DP QPSK receiver module contains optical detectors and amplifiers, as depicted below. See, e.g., OIF-FD-100G-DWDM-01.0 at 6.	

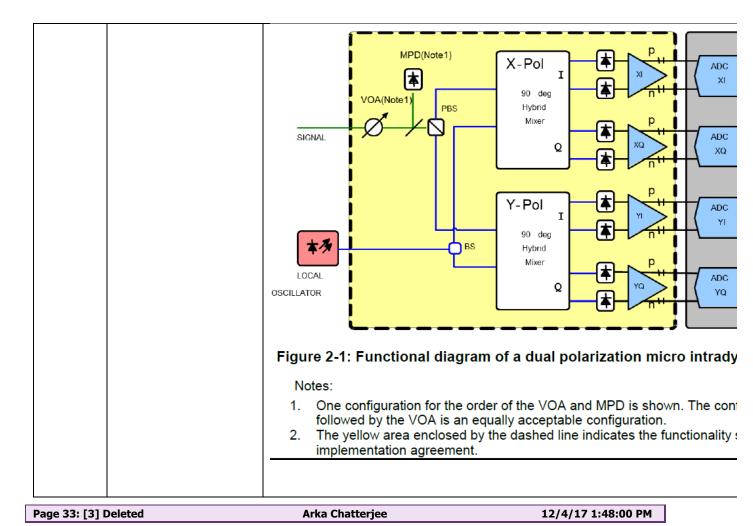


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Asserted	Claim Element	Exemplary Evidence of Infringement
Claim		
No.		
		7. A variable optical attenuator in the signal input path before the signal
		polarization splitting element.
		Additional required functionality for the integrated coherent receiver includes:
		 Automatic Gain Control (AGC) and/or Manual Gain Control (MGC)
		User settable output voltage swing
		 Independent output swing adjustment for each of the four outputs
		 Peak indicators for each output
		(Figure 2-1 is presented below, showing the relationship of the functionalities in addition to the
		presence of ADC and DSP). OIF-DPC-MRX-01.0-IA at 10-11.



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6	The card as recited in		ccused Instrumentalities include pro	grar
	claim 1 wherein the	the energy level detector.		
	thresholds are	D	1::tt: OIE 100C -t1	.14
	programmable.		any limitation, an OIF 100G standar	
			Registers," including an "RX Powe	ir ivi
7	The card as recited in	Threshold Select." (OIF-CFP2-A	ccused Instrumentalities include a de	otool
/	claim 1 wherein the	setting values for the thresholds.	ccused instrumentanties include a de	CICCI
	energy level detector	setting varies for the unesholds.		
	includes a detector	By way of example and without:	any limitation, an OIF 100G standar	·d taı
	controller capable of		Registers," including an "RX Powe	
	setting values for the		.CO-01.0, at 81) On information and	
	thresholds.	controller sets values for the thre		
8	The card as recited in	On information and belief, the A	ccused Instrumentalities include a de	eteci
	claim 7 wherein the	receives an indication of a thresh	old being crossed.	
	detector controller			
	receives an indication		any limitation, an OIF 100G standar	
	of a threshold being	_	Registers," including registers for F	Rx p
	crossed.	warnings, and low and high alarm		
9	The card as recited in	,	ccused Instrumentalities include thre	esho
	claim 1 wherein the	an acceptable energy range for the	e received light.	
	plurality of	D	1::tt: OIE 100C -t1	.14
	thresholds bound an	1	any limitation, an OIF 100G standar	
	acceptable energy range for the received	_	Registers," including an "RX Powe CO-01.0, at 81) The threshold setting	
	light.		nt in order to provide a meaningful i	
	ngnt.	power is out of an acceptable ran	1	naic
D 24- F2	1 D-1-4- J	1		
Page 31: [2		Arka Chatterjee	12/4/17 1:48:00 PM	
12	The card as recited in	The Accused Instrumentalities in	clude an energy level detector meas	ures
	claim 1 wherein the	Dy way of avample and with aut	any limitation the OIE 100C standar	rd to
	energy level detector		any limitation, the OIF 100G standar ures optical power. OIF-DPC-MRX	
	measures optical	monitoring photodiode that meas	uies optical power. Off-DPC-MRA	7- 01
1	power.			



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19	The card as recited in claim 14 wherein the threshold is	he the energy level detector.	
	programmable.		any limitation, an OIF 100G standard ta Registers," including an "RX Power M CO-01.0, at 81)
20	The card as recited in claim 14 wherein the energy level detector	On information and belief, the A setting values for the thresholds.	ccused Instrumentalities include a detec
	includes a detector controller capable of setting a value for the threshold.	have "Alarm/Warning Threshold	any limitation, an OIF 100G standard ta Registers," including an "RX Power M CO-01.0, at 81) On information and be sholds.
21	The card as recited in claim 20 wherein the detector controller	On information and belief, the A receives an indication of a thresh	ccused Instrumentalities include a detect old being crossed.

	receives an indication of the threshold being crossed.	have "Alarm/Warning Thresh warnings, and low and high a	out any limitation, an OIF 100G standard tan nold Registers," including registers for Rx p larms. (OIF-CFP2-ACO-01.0, at 81)
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23	The card as recited in claim 14 wherein the energy level detector measures optical power.	he Accused Instrumentalities include an energy level detector measures t By way of example and without any limitation, the OIF 100G standard ta monitoring photodiode that measures optical power. OIF-DPC-MRX-01	
Page 70: [6]	Deleted	Arka Chatterjee	12/4/17 1:48:00 PM
26	The card as recited in claim 25 wherein the energy level detector includes an OR gate.		
27	The card as recited in claim 25 wherein the modulator is a phase modulator.	phase modulation. For examp the Fujitsu 1100G OIF 168pir transmitting and receiving int Transceiver Product Page, htt modules/100gtrx/index.html); the Fujitsu 100G CFP DCO T with a transmitting and receiv Product Page, http://www.fujithe Fujitsu 100G/200G CFP2 with a transmitting and receiv Transceiver Product Page, htt modules/cfp2-aco/); the Fujitsu 100G CFP Transceiver Product Page, htt modules/100gcfp/); the Fujitsu 100G CFP2 Transceiver Product Page, htt modules/100gcfp/); the Fujitsu 100G CFP2 Transtransceiver card with a transm Transceiver Product Page, htt modules/100gcfp2/); the Fujitsu 100G QSFP28 Tratransmitting and receiving int Page, http://www.fujitsu.com.the Fujitsu 100G/400G LN M transceiver card with a transm Devices Product Page, http://s100g); the Fujitsu 100G/400G Integra transceiver with receiving in the Fujitsu 100G/400G Integra a tra	n Coherent Transceiver (FIM85200) is a transferface for DP-QPSK data. (100G OIF 168p tp://www.fujitsu.com/jp/group/foc/en/produ

the Fujitsu HD62 OTN Switch Aggregator Unit is a transceiver card with receiving interface for DP-QPSK data (Flashwave CDS Data Sheet); the Fujitsu TM61 OTU4 OTN Transponder Demarcation Unit is a transceitransmitting and receiving interface for DP-QPSK data (Flashwave CDS the Fujitsu Flashwave 7420 WDM Platform a transceiver card with a transceiter for DP-QPSK data (Flashwave 7420 Data Sheet)

By way of example and without any limitation, the OIF 100G standard st transmitter module which includes a laser, modulators that modulate phasincluding other components that are not represented, as depicted below. \$ 100G-DWDM-01.0 at 5-6.

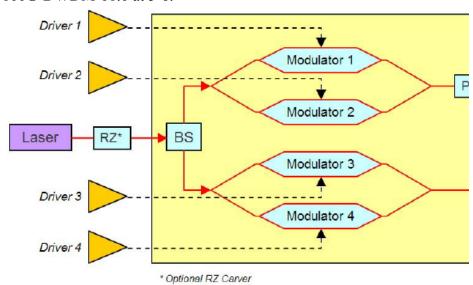


Figure 4. Block diagram of a DP QPSK transmit

By way of example and without any limitation, Fujitsu's Flashwave 9500 1Finity products comprise the card as recited in claim 25 wherein the mo modulator. *See, e.g.*, Exemplary Evidence of Infringement of Claim 3.

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30	The card as recited in	On information and belief, the Accused Instrumentalities include program		
	claim 25 wherein the	the energy level detector.		
	threshold is			
	programmable.	By way of example and without a	ny limitation, an OIF 100G sta	andard taı
		have "Alarm/Warning Threshold	Registers," including an "RX I	Power M
		Threshold Select." (OIF-CFP2-A	CO-01.0, at 81)	
31	The card as recited in	On information and belief, the Ac	cused Instrumentalities include	e a detect
	claim 25 wherein the	setting values for the thresholds.		
	energy level detector			
	includes a detector	By way of example and without a	ny limitation, an OIF 100G sta	andard taı
	controller capable of	have "Alarm/Warning Threshold	Registers," including an "RX I	Power M
		Threshold Select." (OIF-CFP2-A	CO-01.0, at 81) On information	n and bel

	setting a value for the threshold.	controller sets values for the thresholds.
32	The card as recited in claim 25 wherein the detector controller	On information and belief, the Accused Instrumentalities include a detect receives an indication of a threshold being crossed.
	receives an indication of the threshold being crossed.	By way of example and without any limitation, an OIF 100G standard tall have "Alarm/Warning Threshold Registers," including registers for Rx p warnings, and low and high alarms. (OIF-CFP2-ACO-01.0, at 81)

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